# SICKLE-CELL TRAIT IN SOUTHERN INDIA

BY

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When the traveller in East and Central Africa inquires from the inhabitants about their distant past, they will often tell him of tall men, fairer than themselves, bearded and with long hair, who came from afar bringing codes of law, handicrafts, and cattle.

Several leading anthropologists have speculated whether there were migrations to prehistoric Africa from other continents, possibly Asia. Such speculations have been supported by the observation that the tall, broad-shouldered skeleton of the modern Bantu appears only in Neolithic excavations, whereas the types found in older strata are more slender. It had been noted that, with the exception of the Ankole herds, which are related to those of ancient Egypt, the East African cattle show a resemblance to the Indian cow. Similarities are also found between the poultry of Africa and India.

Fortunately for anthropologists the present-day inhabitants of Africa possess distinctive features in their blood—the sickle-cell trait, a very high incidence of a particular combination of Rh antigens known as $R_0$ (cDe), and another blood-group antigen provisionally referred to as He. So far as we know, the sickle-cell trait and sickle-cell anaemia have not been reported in people who were not either Africans or members of groups which must be expected to have an admixture of African blood. For example, Negro slaves undoubtedly mixed with Mediterranean races in Roman times. The sickle-cell trait has not been found in races which do not also show a raised incidence of the gene combination $R_0$ (cDe) (Mourant, 1951). This combination is found comparatively rarely in Northern and Central Europe and in Northern India, with a frequency of approximately 2%. By contrast, it has a frequency of over 50% in all African populations south of the Sahara so far tested. It is distributed fairly evenly all over tropical Africa, regardless of the incidence of the sickle-cell trait (Wiener, 1946; Boyd, 1950; Ikin and Mourant, 1952). The antigen here called He has been detected in about 5% of West Africans but has not been found in the course of testing about 1,000 Europeans (Ikin and Mourant, 1951, 1952).

It seemed possible that an investigation of the blood of certain Southern Indian communities might serve to refute or support the idea of a racial link between Africa and India. The aboriginal tribes were chosen as the group in whom a search for African blood features appeared most likely to yield positive results.

There is no general agreement how the peoples of South India should be classified. They have in the past often been divided into settled communities, or Dravidians, and aborigines, or Pre-Dravidians, but there are objections to this on both linguistic and cultural grounds; nor does the division correspond clearly to anything in the history of these populations. The so-called Pre-Dravidians of the Nilgiri Hills vary from civilized agricultural communities such as the Badagas (who have affiliations with the Canarese) to tribes such as the Irulas, Kurumbas, and Paniyans, who are found living under primitive conditions in the jungle.

## Materials and Methods

Three aboriginal communities—the Badagas, the Todas, and the Irulas—were investigated. Sex, approximate age, and relationship to other persons tested were noted. To determine the incidence of the sickle-cell trait each blood sample was examined after incubation with a 2% sodium metabisulphite solution (Daland and Castle, 1948). Blood samples were collected from 60 Todas, 60 Badagas, and 80 Irulas for the determination of blood groups in the following systems: ABO, MNS, Rh, Duffy, P, and for the detection of the He antigen.

A control group of other peoples was investigated for the sickle-cell trait.

## Results

The sickle-cell-trait incidence among 191 unrelated Badagas was 8.4%, among 60 Todas 3.3%, and among 80 unrelated Irulas 30%. No sickle-cell trait was found among 443 unrelated members of other communities of the region (see Table).

*The Incidence of the Sickle-cell Trait in Some South Indian Communities (With the exception of the Todas, all individuals are unrelated)*

| Population | Number Examined | Sickle-cell Trait | |
|---|---|---|---|
| | | Number of Individuals | % |
| Irulas | 80 | 24 | 30 |
| Badagas | 191 | 16 | 8·4 |
| Todas | 60 | 2 | 3·3 |
| Tamils | 128 | 0 | 0 |
| Malayalis | 111 | 0 | 0 |
| Canarese | 95 | 0 | 0 |
| Telegus | 109 | 0 | 0 |

All first-degree relations have been excluded from the Table, except in the case of the Todas. As the whole Toda community numbers fewer than 500 individuals, practising polyandry, it was impossible to exclude close relatives. However, the 60 samples were collected from seven widely separated settlements; the two sickle-cell-trait carriers were children living in settlements some miles apart.

The incidence of the Rhesus chromosome $R_0$ (cDe) was at the low level found in Europeans and Northern Indians, rather than at that found in Africans. Among 60 Badagas, 2 individuals were of the phenotype $R_0$ or ccDee; among 60 Todas, 2; and among 80 Irulas, none.

None of the 120 blood samples contained the He antigen.

## Discussion

These findings lend support to the idea of an Indian migration to Africa in prehistoric times. The reverse possibility—an influx of African blood bringing the sickle-cell trait to the hills of Southern India—should have resulted in a raised incidence of the gene combination $R_0$ (cDe). The fact that the incidence of $R_0$ is high everywhere among the negro races of Africa, whereas the incidence of the sickle-cell trait shows wide variations among them, suggests that Africa received the sickle-cell trait at a period too recent to allow an even distribution over the continent. It is realized that there are other possible interpretations of the above results.

It is not suggested that the actual migrants to Africa were Badagas or Todas or even Irulas. The first came from the North to the Nilgiri Hills only within the last 1,000 years; the second, though allegedly autochthonous, resemble Europeans in appearance and in their possession of the subgroup $A_2$ and of the Rh genotype rr (cde/cde). It is likely that at least the Badagas and Todas received the sickle-cell trait from older Southern Indian communities.

The examination of "pre-Dravidian" people is being continued with the hope of further defining the distribution of the sickle-cell trait in Southern India. However, the main purpose of the investigation has been achieved since the results lend support to the possibility of a link between prehistoric Africa and India.


### Summary

The sickle-cell trait was found to be present in a number of individuals belonging to three aboriginal communities of Southern India. There was a low incidence of the Rh chromosome $R_0$ (cDe).

No sickle-cell-trait carrier was discovered among a control group of the non-aboriginal or "Dravidian" population.

The possible anthropological significance of these findings is discussed.


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# THE SICKLE-CELL TRAIT IN WESTERN NIGERIA

## A SURVEY OF 1,881 CASES IN THE YORUBA

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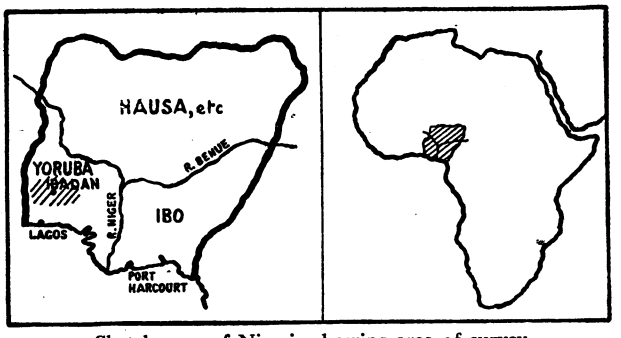
Yorubaland occupies the greater portion of Western Nigeria, lying between the Lagos lagoon in the south, the River Niger in the north, the Dahomey frontier in the west, and the Benin country in the east. Ibadan itself is a huge sprawling city of mud-brick buildings. The population, which is mainly Yoruba, is in the region of half a million. Ibadan's present importance is due to the fact that it lies at the centre of the cocoa-growing area of Nigeria, although it has been the site of a considerable town for over a hundred years.

The Yoruba are for the most part peasant farmers and petty traders. Their diet is largely vegetarian, the staple farinaceous foods being yams, maize, and cassava. Animal protein is deficient in the food of the majority, as cattle cannot be reared locally but have to be brought for slaughtering from northern Nigeria.

### Groups Examined

In this survey 1,881 Yoruba were examined. The majority were from Ibadan, although some came from all parts of Yorubaland. Sickling was looked for by the method of Scriver and Waugh (1930), although no preliminary congestion was used. The finger was pricked and a drop of blood transferred to a coverslip. This was inverted and placed face downwards on a clean slide. The coverslip was ringed with petroleum jelly and the preparation examined for sickling after 72 hours. In a few, the enclosed blood became either haemolysed or dried. These cases were not included in the series.




Sketch map of Nigeria showing area of survey

It is felt that the cases reviewed here represent a fair cross-section of the Yoruba population of Ibadan. The newborn babies were examined in the maternity wards and the other infants while attending welfare clinics. The older pre-school children and the elderly were difficult to test in large numbers. The few that were examined were in-patients, out-patients. or visitors at hospital. The three groups of schoolchildren were tested at several schools serving a wide area of the town. The young adult male group was the least balanced, as the majority were either policemen or Army recruits, and were probably of more than average physical development.

### Results of the Survey

The results are shown in Table I. The average incidence in the whole series of 1,881 was 23.7%. As can be seen, no case of sickling was observed in any of the 51 newborn babies examined. The possible significance of this is discussed later. In the other groups the incidence of sicklaemia varied from 19.2% in young adult males to 28.3% in children between the ages of 1 and 4 years. If the first group containing babies up to 2 weeks old is omitted from analysis, a $\chi^2$ test shows that the proportions of positive cases in the other age groups do not vary more than would be expected by chance ($\chi^2=8.83$). For 7 degrees of freedom P lies between 0.3 and 0.2. In other words, the sickle-cell trait would appear to occur with equal frequency at all ages, with the exception of the newborn.

TABLE I.—*Results of Survey for the Sickle-cell Trait in 1,881 Yoruba*

| Age | No. Examined | No. Positive | % Positive |
|---|---|---|---|
| 1st 2 weeks .. .. .. | 51 | None | — |
| Over 2 weeks to 1 year .. .. | 120 | 30 | 25·0 |
| ,, 1 year to 4 years .. .. | 60 | 17 | 28·3 |
| ,, 4 years ,, 8 ,, .. .. | 301 | 84 | 27·9 |
| ,, 8 ,, ,,15 ,, .. .. | 512 | 133 | 25·0 |
| ,, 15 ,, ,,18 ,, .. .. | 144 | 30 | 20·9 |
| Young adult males .. .. | 302 | 58 | 19·2 |
| ,, ,, females .. .. | 339 | 80 | 23·6 |
| Older adults (males and females) | 52 | 14 | 26·9 |
| Total .. .. | 1,881 | 446 | 23·7 |

### Discussion

Comparatively few surveys for the sickle-cell trait have been undertaken in tropical Africa, and results in different countries vary. Thus, 45% of the pygmoid Baamba show sickling (Lehmann and Raper, 1949), while Sarmento (1944) found only 8% positive in a survey of adult males in